Machine Learning

Assignment 1

Muhammad Umar Asif

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Concept Learning of a bird:

Input: Object

Output: Bird

1 for Bird

0 for Not-Bird

Representation of Input

- Attribute ‘Wing Span’ - possible values 'Short, Medium, Long'
- Attribute ‘Beak Shape’ - possible values 'Pointed, Hooked, Blunt'
- Attribute ‘Feather Color’ - possible values 'Black, Brown, White, Other'

Representation of Output

Attribute ‘Bird’ - possible values 'Yes, No'

Instance Space [X]:

Size of instance space [X] = 3 * 3 *4 = 36

X	Wing Span	Beak Shape	Feather Color	Bird
X1	Short	Pointed	Black	-
X2	Short	Pointed	Brown	-
X3	Short	Pointed	White	-
X4	Short	Pointed	Other	-
X5	Short	Hooked	Black	-
X6	Short	Hooked	Brown	-
X7	Short	Hooked	White	-
X8	Short	Hooked	Other	-
X9	Short	Blunt	Black	-
X10	Short	Blunt	Brown	-
X11	Short	Blunt	White	-
X12	Short	Blunt	Other	-
X13	Medium	Pointed	Black	-
X14	Medium	Pointed	Brown	-
X15	Medium	Pointed	White	-
X16	Medium	Pointed	Other	-

X17	Medium	Hooked	Black	-
X18	Medium	Hooked	Brown	-
X19	Medium	Hooked	White	-
X20	Medium	Hooked	Other	-
X21	Medium	Blunt	Black	-
X22	Medium	Blunt	Brown	-
X23	Medium	Blunt	White	-
X24	Medium	Blunt	Other	-
X25	Long	Pointed	Black	-
X26	Long	Pointed	Brown	-
X27	Long	Pointed	White	-
X28	Long	Pointed	Other	-
X29	Long	Hooked	Black	-
X30	Long	Hooked	Brown	-
X31	Long	Hooked	White	-
X32	Long	Hooked	Other	-
X33	Long	Blunt	Black	-
X34	Long	Blunt	Brown	-
X35	Long	Blunt	White	-
X36	Long	Blunt	Other	-

Concept Space:

|C| = 2^|X| = 2^|36| = 68,719,476,736

X	Wing Span	Beak Shape	Feather Color	Bird
X1	Short	Pointed	Black	c(X1)
X2	Short	Pointed	Brown	c(X2)
X3	Short	Pointed	White	c(X3)
X4	Short	Pointed	Other	c(X4)
X5	Short	Hooked	Black	c(X5)
X6	Short	Hooked	Brown	c(X6)
X7	Short	Hooked	White	c(X7)
X8	Short	Hooked	Other	c(X8)
X9	Short	Blunt	Black	c(X9)
X10	Short	Blunt	Brown	c(X10)
X11	Short	Blunt	White	c(X11)
X12	Short	Blunt	Other	c(X12)
X13	Medium	Pointed	Black	c(X13)
X14	Medium	Pointed	Brown	c(X14)
X15	Medium	Pointed	White	c(X15)
X16	Medium	Pointed	Other	c(X16)
X17	Medium	Hooked	Black	c(X17)
X18	Medium	Hooked	Brown	c(X18)
X19	Medium	Hooked	White	c(X19)
X20	Medium	Hooked	Other	c(X20)
X21	Medium	Blunt	Black	c(X21)

X22	Medium	Blunt	Brown	c(X22)
X23	Medium	Blunt	White	c(X23)
X24	Medium	Blunt	Other	c(X24)
X25	Long	Pointed	Black	c(X25)
X26	Long	Pointed	Brown	c(X26)
X27	Long	Pointed	White	c(X27)
X28	Long	Pointed	Other	c(X28)
X29	Long	Hooked	Black	c(X29)
X30	Long	Hooked	Brown	c(X30)
X31	Long	Hooked	White	c(X31)
X32	Long	Hooked	Other	c(X32)
X33	Long	Blunt	Black	c(X33)
X34	Long	Blunt	Brown	c(X34)
X35	Long	Blunt	White	c(X35)
X36	Long	Blunt	Other	c(X36)

A possible concept:

C = < Wing_Span = short AND Beak_Shape = pointed AND Feather_Color = brown OR Wing_Span = medium AND Beak_Shape = hooked AND Feather_Color = black>

X	Wing Span	Beak Shape	Feather Color	Bird
X1	Short	Pointed	Black	0
X2	Short	Pointed	Brown	1
X3	Short	Pointed	White	0
X4	Short	Pointed	Other	0
X5	Short	Hooked	Black	0
X6	Short	Hooked	Brown	0
X7	Short	Hooked	White	0
X8	Short	Hooked	Other	0
X9	Short	Blunt	Black	0
X10	Short	Blunt	Brown	0
X11	Short	Blunt	White	0
X12	Short	Blunt	Other	0
X13	Medium	Pointed	Black	1
X14	Medium	Pointed	Brown	0
X15	Medium	Pointed	White	0
X16	Medium	Pointed	Other	0
X17	Medium	Hooked	Black	0
X18	Medium	Hooked	Brown	0
X19	Medium	Hooked	White	0
X20	Medium	Hooked	Other	0
X21	Medium	Blunt	Black	0
X22	Medium	Blunt	Brown	0
X23	Medium	Blunt	White	0
X24	Medium	Blunt	Other	0
X25	Long	Pointed	Black	0
X26	Long	Pointed	Brown	0
X27	Long	Pointed	White	0

X28	Long	Pointed	Other	0
X29	Long	Hooked	Black	0
X30	Long	Hooked	Brown	0
X31	Long	Hooked	White	0
X32	Long	Hooked	Other	0
X33	Long	Blunt	Black	0
X34	Long	Blunt	Brown	0
X35	Long	Blunt	White	0
X36	Long	Blunt	Other	0